

WHAT IS CLAIMED IS:

1 1. For use with a gateway communicatively coupled to a remote signal source,
2 a local system controller comprising:
3 a user input device;
4 a wireless communication circuit configured and arranged to receive input
5 signals sent from the gateway in response to the remote signal source and to send signals
6 including information about the local system to the gateway; and
7 a control circuit coupled to the user input device and the wireless
8 communication circuit and configured and arranged to communicate control signals to a
9 local system for controlling energy consumption thereof in response to user inputs received
10 via the user input device and to input signals received via the wireless communication
11 circuit.

1 2. The controller of claim 1, further comprising a thermostat with a
2 temperature sensor, wherein the user input device is configured and arranged to receive
3 thermostat inputs and wherein the control circuit is configured and arranged to control the
4 local system as a function of the thermostat inputs, the temperature sensor and the input
5 signals.

1 3. The controller of claim 2, further comprising a base including the wireless
2 communication circuit and an antenna for communicating with the gateway, wherein the
3 thermostat includes the user input device and the control circuit and is further configured
4 and arranged to control the wireless communication circuit.

1 4. The controller of claim 3, wherein the base and thermostat are configured
2 and arranged to replace a conventional thermostat arrangement for an HVAC system and
3 to communicate the control signals to the HVAC system via electrical wires adapted to
4 couple the conventional thermostat to an internal controller for the HVAC system.

1 5. The controller of claim 1, further configured and arranged to bind to a
2 particular gateway and to respond to input signals from the particular gateway as a function
3 of the binding.

1 6. The controller of claim 5, further configured and arranged to respond to
2 input signals received only from the particular gateway.

1 7. The controller of claim 5, wherein the wireless communication circuit is
2 configured and arranged to pass input signals received from the particular gateway to the
3 control circuit as a function of the binding.

1 8. The controller of claim 5, wherein the control circuit is configured and
2 arranged to respond to input signals received from the particular gateway as a function of
3 the binding.

1 9. The controller of claim 5, wherein the wireless communication circuit has a
2 unique identification and is configured and arranged to transmit the unique identification to
3 the particular gateway to bind to the particular gateway.

1 10. The controller of claim 9, wherein the control circuit is configured and
2 arranged to: receive a binding response from the gateway including the unique
3 identification and a control identification, store the control identification and respond to
4 input signals from the gateway that include the control identification.

1 11. The controller of claim 1, wherein the control circuit is configured and
2 arranged to respond to utility input signals from the gateway indicating a high energy
3 demand period by reducing energy consumption of the local system during the high energy
4 demand period.

1 12. The controller of claim 1, wherein the control circuit is configured and
2 arranged to control the local system as a function of utility inputs indicating utility pricing
3 information received by the wireless communications circuit from the gateway.

1 13. The controller of claim 12, wherein the control circuit is configured and
2 arranged to automatically set the local system's energy use as a function of utility rate tier
3 information received from the gateway.

1 14. The controller of claim 1, wherein the control circuit is configured and
2 arranged to display utility rate tier information received from the gateway for users at the
3 controller and to control the local system in response to user input selections related to the
4 rate tier information.

1 15. The controller of claim 1, wherein the control circuit and the wireless
2 communication circuit are configured and arranged to send compliance information to the
3 gateway indicative of a condition of compliance of the local system with the input signals.

1 16. The controller of claim 15, wherein the control circuit and the wireless
2 communication circuit are configured and arranged to send acceptance information to the
3 gateway indicative of a condition of a user's acceptance of an invitation to participate in an
4 energy-saving event advertised via the input signals.

1 17. The controller of claim 16, wherein the user input device is configured and
2 arranged to receive user inputs indicating the condition of the user's acceptance.

1 18. The controller of claim 15, wherein the control circuit is configured and
2 arranged to compare the input signals to stored configuration information input via the user
3 input device and to automatically participate in energy-saving events identified via the
4 input signals as a function of the comparison.

1 19. The controller of claim 18, wherein the control circuit is configured and
2 arranged to override the automatic participation in an energy-saving event in response to
3 overriding inputs received via the user input device and to communicate the override
4 condition to the gateway via the wireless communication circuit.

1 20. An HVAC control system comprising:

2 a wireless HVAC controller arrangement including a user input device, a
3 wireless transceiver and a thermostat; and
4 a wireless gateway configured and arranged to wirelessly communicate
5 control inputs to the HVAC controller via the wireless transceiver in response to remote
6 control signals received from a remote source, the wireless HVAC controller arrangement
7 being configured and arranged to control HVAC equipment as a function of the remote
8 control signals and user inputs received via the user input device and to report
9 characteristics of the operation of the HVAC equipment to the remote source via the
10 wireless gateway.

1 21. The HVAC control system of claim 20, wherein the wireless HVAC
2 controller arrangement is configured and arranged to receive user inputs for controlling the
3 HVAC equipment and to override the user inputs as a function of the remote control
4 signals received via the wireless gateway.

1 22. The HVAC control system of claim 20, wherein the wireless HVAC
2 controller arrangement is configured and arranged to receive user inputs for overriding the
3 remote control signals received via the gateway and to communicate the overriding
4 condition to the remote source via the gateway.

1 23. The HVAC control system of claim 20, wherein the wireless HVAC
2 controller arrangement comprises:
3 a base including the wireless transceiver and an antenna for wirelessly
4 communicating with the gateway; and
5 a thermostat enclosure including the thermostat and the user input device
6 and configured and arranged to physically and electrically couple to the base for
7 communicating with and controlling the wireless transceiver.

1 24. The HVAC control system of claim 20, further comprising a plurality of
2 wireless HVAC controller arrangements, each including a user input device, a wireless
3 transceiver and a thermostat and each being configured and arranged to respond to remote
4 control signals received from the wireless gateway.

1 25. The HVAC control system of claim 24, wherein the gateway is configured
2 and arranged to individually bind to each of the plurality of wireless HVAC controller
3 arrangements for selectively communicating therewith and wherein each of the HVAC
4 controller arrangements is configured and arranged to process signals as a function of the
5 individual binding.

1 26. The HVAC control system of claim 25, wherein the gateway is configured
2 and arranged to assign an identifier to each of the plurality of wireless HVAC controller
3 arrangements to bind thereto, the assigned identifiers being in a range of identifier values,
4 and wherein the gateway identifies a wireless signal as a signal coming from one of the
5 plurality of wireless HVAC controller arrangements by determining that an identifier
6 associated with the wireless signal is in the range of identifier values.

1 27. The HVAC control system of claim 20, further comprising a plurality of
2 wireless HVAC controller arrangements adapted to control environmental conditions in
3 different zones supplied by the HVAC equipment, each including a user input device, a
4 wireless transceiver and a thermostat and each being configured and arranged to respond to
5 remote control signals received from the wireless gateway.

1 28. The HVAC control system of claim 20, further comprising a second
2 wireless HVAC controller arrangement adapted to control additional HVAC equipment in
3 response to user inputs and remote control signals, said wireless transceiver being
4 configured and arranged to relay remote control signals received from the remote source to
5 the second wireless HVAC controller arrangement and to relay operational characteristics
6 of the additional HVAC equipment from the second wireless HVAC controller
7 arrangement to the remote source via the gateway.

1 29. The HVAC control system of claim 20, wherein the wireless gateway is
2 configured and arranged to receive remote control inputs from a user via the remote
3 source, the remote control inputs including user inputs for the HVAC equipment, the
4 HVAC controller arrangement being configured and arranged to control the HVAC

5 equipment as a function of user inputs received with the remote control inputs and
6 overriding user inputs received via the user input device.

1 30. The HVAC control system of claim 20, wherein the wireless gateway is
2 configured and arranged to receive remote control inputs from a utility company via the
3 remote source, the remote control inputs including utility control inputs for the HVAC
4 equipment, the HVAC controller arrangement being configured and arranged to control the
5 HVAC equipment as a function of the utility control inputs.

1 31. For use with a gateway communicatively coupled to a remote signal source,
2 a local system controller comprising:

3 means for receiving user input;
4 wireless means for receiving input signals sent from the gateway in
5 response to the remote signal source and for sending signals including information about
6 the local system to the gateway; and
7 control means, coupled to the user input device and the wireless
8 communication circuit, for communicating control signals to a local system for controlling
9 energy consumption thereof in response to user inputs received via the user input device
10 and to input signals received via the wireless communication circuit.

1 32. An HVAC controller comprising:

2 a thermostat;
3 a temperature sensor;
4 a user interface including an input device and a display;
5 a transceiver configured and arranged to wirelessly communicate with a
6 utility company source for receiving utility control signals; and
7 a control circuit configured and arranged to control an HVAC system as a
8 function of the utility control signals, the temperature sensor and user inputs received via
9 the user interface, and further to communicate characteristics of the HVAC system
10 operation to the utility company via the transceiver.

1 33. The HVAC controller of claim 32, wherein the control circuit and the
2 transceiver are further configured and arranged to pass wireless communications signals as
3 a gateway between the utility company source and at least one other HVAC controller for
4 sending utility control signals to the at least one other HVAC controller for controlling
5 another HVAC system and for reporting HVAC operational characteristics associated with
6 the at least one other HVAC controller to the utility company source.

1 34. A method for controlling an HVAC system from a remote location, the
2 method comprising:

3 sending a utility control signal to a local gateway;
4 in response to the utility control signal, sending a wireless signal from the
5 local gateway to an HVAC controller coupled to control the HVAC system in response to
6 user inputs and the utility control signal;
7 in response to the wireless signal, setting an operational characteristic of the
8 HVAC system using the HVAC controller; and
9 reporting actual operational characteristics of the HVAC system with the
10 HVAC controller by sending wireless signals to the remote location via the gateway.

1 35. The method of claim 34, further comprising:

2 using a communications identifier associated with signals sent by the
3 gateway to the HVAC controller to identify the HVAC controller as the intended recipient
4 of the signals.

1 36. The method of claim 35, further comprising:

2 polling the HVAC controller with the gateway;
3 in response to the polling, sending a unique identifier from the HVAC
4 controller to the gateway, the unique identifier being unique to the HVAC controller;
5 sending the communications identifier to the HVAC controller using the
6 unique identifier and storing the communications identifier at the HVAC controller; and
7 wherein using a communications identifier includes comparing the stored
8 communications identifier with a communications identifier associated with signals from
9 the gateway to identify the HVAC controller as the intended recipient of the signals.

1 37. A method for installing and operating a system for controlling HVAC
2 equipment in response to utility control signals, the method comprising:
3 installing a wireless HVAC controller at a user-accessible location remote
4 from the HVAC equipment, the wireless HVAC controller being adapted to receive control
5 inputs for controlling the HVAC system and to control the HVAC system in response to
6 the control inputs, the control inputs including local user inputs and remote utility control
7 signals wirelessly received from a utility company; and
8 sending wireless utility control signals from the utility company to the
9 wireless HVAC controller and controlling the HVAC system with the wireless utility
10 control signals.

1 38. The method of claim 37, further comprising installing a gateway configured
2 and arranged to send the wireless utility control signals to the wireless HVAC controller in
3 response to signals sent from a utility company to the gateway.

1 39. The method of claim 38, further comprising communicatively binding the
2 gateway to the wireless HVAC controller by establishing a unique communications
3 identifier that indicates that a particular signal is intended for the wireless HVAC
4 controller and including the unique communications identifier with the wireless utility
5 control signals sent to the wireless HVAC controller.